IN THE CLAIMS

1. (Currently Amended) Method for pre-heating, transforming and melting a metal charge comprising metal scrap, in an electric arc furnace associated with a tunnel that transports, pre- heats and discharges said scrap, the furnace comprising a hearth and a roof through which the electrodes pass, comprising the steps of:

- weighing the furnace at least periodically to detect the quantity of discharged scrap present inside the furnace itself;

- detecting the temperature of the liquid bath inside the furnace at least periodically, and

- [[detecting]] at least the discharge delivery of the scrap inside the furnace is detected by weighing and ~~regulating at least the discharge delivery of the scrap inside the furnace~~ is regulated to maintain said temperature of the liquid bath around a pre-determined value.

2. (Previously presented) Method as in claim 1, wherein electric power delivered to the furnace is varied continuously from a minimum value in correspondence with a first unloading step of the scrap to a maximum value in correspondence with a melting step according to the quantity of scrap present inside the furnace as detected by weighing the furnace.

3. (Previously presented) Method as in claim 1, wherein loading of the furnace with the scrap is interrupted before tapping of liquid metal from the liquid bath for an interval of between about 8 and 12% of the overall time of the cycle.

4. (Previously presented) Method as in claim 1, wherein the feed of electric power to the furnace is interrupted before tapping for a time of up to 5% of the overall time of the cycle.

5. (Previously presented) Method as in claim 2, wherein said minimum value of electric power delivered is made to increase from an initial value of about 40-50% of the working value, to its maximum value.

6. (Previously presented) Method as in claim 2, wherein a quantity of liquid metal of around 30-40% of the overall capacity is always left in the furnace to constitute a liquid reserve for the subsequent cycle.

7. (Previously presented) Method as in claim 2, wherein in the tapping step the electrodes are at least raised from the liquid bath and electric feed to them is interrupted.

8. (Currently amended) Method as in claim 2, wherein between the end of [[the] a tapping operation and the start of loading the scrap for the subsequent cycle, electric feed to the electrodes is interrupted and the following operations are carried out:

a) the furnace is rotated from a tapping position to a slagging position to interrupt the flow of liquid steel;

b) cleaning of a tapping hole is controlled;

c) a tapping channel is filled with granular material with a high melting point;

d) the furnace is returned to a horizontal position and abutments are inserted that limit the rotation to reduced values during normal functioning;

e) the electrodes are enabled to descend and delivery of electric power is restored.

9. (Withdrawn and currently amended) Method as in claim 1, wherein ~~Plant for pre-heating, transforming and melting a metal charge consisting of metal scrap, comprising:~~

~~a tunnel for transporting and pre-heating the scrap and an electric arc furnace,~~

said electric furnace [[comprising]] comprises a hearth to contain the scrap and a covering roof through which electrodes pass, supported and moved by relative arms,

weighing means [[to weigh]] weighs said electric furnace,

detecting means [[to detect]] detects the temperature of a bath of liquid metal inside said furnace, and

regulating means regulates ~~able to regulate~~ the speed of unloading the scrap inside said furnace according to detections made by said weighing means to keep the temperature of said bath of liquid metal around [[a]] the pre-determined value.

10. (Withdrawn and currently amended) [[Plant]] Method as in claim 9, wherein said weighing means comprise load cells.

11. (Withdrawn and currently amended) [[Plant]] Method as in claim 9, wherein said hearth is mounted on jacks able to make the hearth oscillate for a limited angle, comprised between ±4°, during normal functioning, for example during the steps of loading, melting and refining the liquid metal, and for a greater angle, comprised

between -15° and +25°, during the steps of discharging the slag and tapping the liquid metal.

12. (Withdrawn and currently amended) [[Plant]] Method as in claim 9, wherein said hearth has a shape, in relation to the inclination that the hearth assumes in [[the] a step of tapping the liquid metal, to keep a liquid pool equal to about 30-40% of its capacity.

13. (Withdrawn and currently amended) [[Plant]] Method as in claim 9, wherein said transport and pre-heating tunnel comprises a plurality of injection systems, wherein at least the injection system nearest the electric furnace has at least a burner and wherein at least in a position adjacent to said burner there is at least an air injector.

14. (Withdrawn and currently amended) [[Plant]] Method as in claim 9, wherein in the initial part of said tunnel, in a position adjacent to a pre-heated fume-outlet pipe, there is a compensation chamber able to function as a sealing system to prevent exhaust fumes emerging from the tunnel from leaking into the atmosphere.

15. (Withdrawn and currently amended) [[Plant]] Method as in claim 9, wherein in cooperation with said transport and pre-heating tunnel there is a sedimentation chamber to deposit the particulate, and the sedimentation chamber is associated with a cooling tower to take the temperature of fumes, entering at about 20 m/s, to about 250°C or less.

16. (Withdrawn and currently amended) [[Plant]] Method as in claim 15, wherein the fumes enter into the sedimentation chamber at about 800°C.

17. (Withdrawn and currently amended) [[Plant]] Method as in claim 15, wherein the fumes are cooled in the cooling tower at a cooling speed of not less than 250°C/sec.

18. (Withdrawn and currently amended) [[Plant]] Method as in claim 15, wherein the fumes are cooled in the cooling tower at a cooling speed of not less than 400°C/sec.